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Indian Standard

**SPECIFICATION FOR
INTERCHANGEABLE CONICAL
GROUND-GLASS JOINTS**

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Indian Standard

SPECIFICATION FOR INTERCHANGEABLE CONICAL GROUND-GLASS JOINTS

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Indian Standard

SPECIFICATION FOR INTERCHANGEABLE CONICAL GROUND-GLASS JOINTS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 27 May 1969, after the draft finalized by the Laboratory Glassware and Related Apparatus Sectional Committee had been approved by the Chemical Division Council.

0.2 To ensure interchangeability between conical ground-glass joints, irrespective of where they are made, the Sectional Committee responsible for the preparation of this standard felt that it is necessary that their requirements such as taper, large end diameter, length of ground zone and surface finish, including appropriate tolerances, be adequately specified. This has been met by adopting details of dimensions provided in ISO/R 383-1964 'Interchangeable conical ground-glass joints', prepared by the International Organization for Standardization. For this reason, the nominal dimensions are based on joints already widely used in many countries. The series of large end diameters represents the nearest acceptable compromise to the R 40/3 series of preferred numbers (5, 7.5, 100) laid down in ISO/R 3-1953 'Preferred numbers—series of preferred numbers'* prepared by the International Organization for Standardization.

0.3 With a view to allowing a rapid checking of the essential dimensions a gauging system has been prescribed in this standard. A leakage test has also been prescribed to ascertain suitability of the joints.

0.4 This standard contains clause 6.2 which provides for agreement between the purchaser and the supplier.

0.5 For the purpose of deciding whether a particular requirement of this standard has been complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS: 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of test for interchangeable conical ground-glass joints.

*Substantially corresponds to IS : 1076 - 1957 Preferred numbers.

†Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.1 For the purpose of this standard the definitions given in IS: 1382-1961* in addition to the following shall apply.

2.1.1 Cone and Socket—The term 'cone' (male part of the joint) signifies the part which is inserted, and the term 'socket' (female part of the joint) signifies the part of the joint into which the cone is inserted.

2.1.2 Components—cone or socket of a joint.

3. SIZE DESIGNATION

3.1 In this specification, the size designation of the joint is expressed by the large end diameter of the ground zone rounded off in millimetres and the length of the ground zone in millimetres separated by an oblique or horizontal stroke, for example, 19/26 or $\frac{19}{26}$.

4. REQUIREMENTS

4.1 Taper—The cones and sockets of the joints shall be made to have a taper of 1 increment on diameter for 10 increments on axial length with a tolerance ± 0.006 on the diameter increment, that is, a taper of 1.00 ± 0.006 in 10.

4.2 Dimensions

4.2.1 Large End Diameters—Conical ground-glass joints shall have the following nominal large end diameters:

5, 7.5, 10, 12.5, 14.5, 18.8, 21.5, 24, 29.2, 34.5, 40, 45, 50, 60, 71, 85 and 100 mm.

4.2.2 Length of the Ground Zone—There shall be 4 series of joints, namely, k_2 , k_4 , k_6 , and k_8 , as given in Table 1.

4.2.3 Tolerances on Diameter and Length—The diameter and length of the ground zone of a component shall be such that when tested in accordance with the method prescribed in Appendix A using the appropriate gauge and with its axis in the plane of the dimensional frame shown in Fig. 1, it fits in such a way that the upper and lower edges of the ground surface fall within the zones of height h_1 and h_2 respectively; the values of d , l , h_1 and h_2 for gauges for any particular joint size being taken from Table 2.

NOTE—For special purposes, the ground surface may extend beyond these limits provided the zone of length (l) is always included within this ground portion.

*Glossary of terms relating to glass industry.

TABLE 1 SERIES OF JOINTS

(Clause 4.2.2)

SL No.	NOMINAL LARGE END DIAMETER	LENGTH OF GROUND ZONE			
		K ₂ Series	K ₄ Series	K ₆ Series	K ₈ Series
(1)	(2)	(3)	(4)	(5)	(6)
	mm	mm	mm	mm	mm
i)	5	—	9	13	18
ii)	7.5	—	11	16	22
iii)	10	—	13	19	25
iv)	12.5	—	14	21	28
v)	14.5	—	15	23	30
vi)	18.8	9	17	26	35
vii)	21.5	—	19	28	37
viii)	24	10	20	29	39
ix)	29.2	11	22	32	43
x)	34.5	12	23	35	47
xi)	40	13	—	38	—
xii)	45	13	—	40	—
xiii)	50	14	—	42	—
xiv)	60	—	—	46	—
xv)	71	—	—	51	—
xvi)	85	—	—	55	—
xvii)	100	—	—	60	—

NOTE — The length of the ground zone (l), in millimetres has been calculated from the formula:

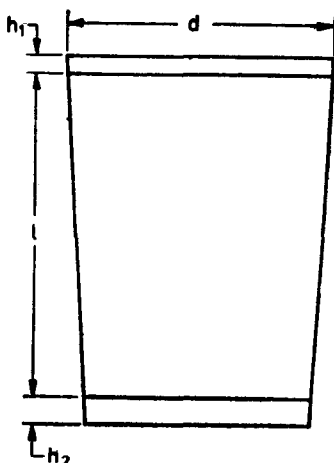
$$l = k \sqrt{d}$$

where

k = a constant, and

d = large end diameter in millimetres.

The four series have been obtained by using the values 2, 4, 6 and 8 for the constant k .



Taper 1 : 10 (Increase of Diameter/Length)

FIG. 1 DIMENSIONAL FRAME

TABLE 2 DIMENSIONS AND TOLERANCES FOR GAUGES

(Clause 4.2.3)

SL No.	NOMINAL DIAMETER OF JOINT	<i>d</i> mm	K ₂ SERIES			K ₄ SERIES			K ₆ SERIES			K ₈ SERIES		
			<i>l</i> *	<i>h</i> ₁ †	<i>h</i> ₂ †	<i>l</i> *	<i>h</i> ₁ †	<i>h</i> ₂ †	<i>l</i> *	<i>h</i> ₁ †	<i>h</i> ₂ †	<i>l</i> *	<i>h</i> ₁ †	<i>h</i> ₂ †
			mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
i)	5	5.1 ± 0.008	—	—	—	8	2	2	12	2	2	17	2.5	2
ii)	7.5	7.6 ± 0.008	—	—	—	10	2	2	15	2	2	21	2.5	2
iii)	10	10.1 ± 0.008	—	—	—	12	2	2	18	2	2	24	2.5	2
iv)	12.5	12.6 ± 0.010	—	—	—	13	2	2	20	2	2	27	2.5	2
v)	14.5	14.6 ± 0.010	—	—	—	14	2	2	22	2	2	29	2.5	2
vi)	18.8	18.9 ± 0.015	8	2.5	2	16	2	2	25	2	2	34	2.5	2
vii)	21.5	21.6 ± 0.015	—	—	—	18	2	2	27	2	2	36	2.5	2
viii)	24	24.1 ± 0.015	9	2.5	2	19	2	2	28	2	2	38	2.5	2
ix)	29.2	29.3 ± 0.015	10	2.5	2	21	2	2	31	2	2	40	2.5	3.5
x)	34.5	34.6 ± 0.015	11	2.5	2	22	2	2	34	2	2	43	2.5	3.5
xi)	40	40.1 ± 0.015	11	2.5	2.5	—	—	—	37	2	2	—	—	—
xii)	45	45.1 ± 0.015	11	2.5	2.5	—	—	—	39	2	2	—	—	—
xiii)	50	50.1 ± 0.015	12	2.5	2.5	—	—	—	41	2	3	—	—	—
xiv)	60	60.1 ± 0.015	—	—	—	—	—	—	45	2	3	—	—	—
xv)	71	71.1 ± 0.020	—	—	—	—	—	—	50	2	3	—	—	—
xvi)	85	85.1 ± 0.020	—	—	—	—	—	—	54	2	3	—	—	—
xvii)	100	100.1 ± 0.020	—	—	—	—	—	—	59	2	3	—	—	—

*Tolerance on *l* = ± 0.015 mm.†Tolerance on *h*₁ and *h*₂ = ± 0.010 mm.

4.2.4 Leakage Test—Conical ground-glass joints shall satisfy the requirements of the test prescribed in Appendix B.

5. WORKMANSHIP

5.1 The engaging surfaces of the cone and socket shall be precision-ground to ensure an accurate fit and reasonable freedom from surface blemishes and leakage.

5.2 They shall be made from extra heavy wall tubing and ruggedly tooled for extra service life.

NOTE—It is desirable to form the socket with a slight but not excessive flare at the open end.

6. MARKING AND PACKING

6.1 Each cone and each socket shall have permanently and legibly marked on it as near as convenient to the ground portion:

- a) The size designation of joint, and
- b) The makers' identification mark.

These inscriptions shall be employed whether the cones and sockets form integral parts of an apparatus or supplied as individual items. When joints form parts of other apparatus it is to be understood that this marking relates to the joint only and it should, therefore, be so placed as to be directly associated with the joint.

6.1.1 The joints may also be marked with the ISI Certification Mark.

NOTE—The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard; under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

6.2 Packing—Joints shall be packed as agreed to between the purchaser and the supplier.

7. TESTING AND INSPECTION

7.1 All the joints shall be tested individually for conformity to all the requirements of this specification.

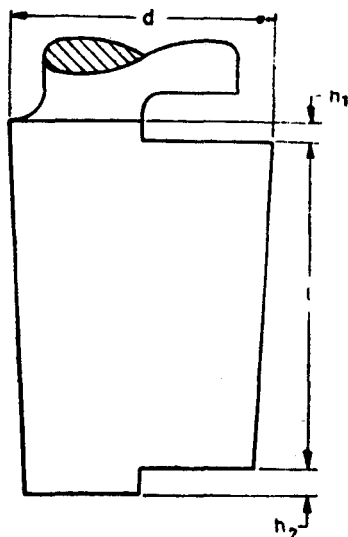
APPENDIX A

(Clause 4.2.3)

MEASUREMENT OF DIMENSIONS OF INTERCHANGEABLE CONICAL GROUND-GLASS JOINTS

A-1. GAUGES

A-1.1 The gauges for cones are conical rings with a step at each end and the gauges for sockets are conical plugs with a step at each end as shown in Fig. 2 and 3. The cone semi-angle of each gauge shall be $2^{\circ} 51' 45''$ to within a tolerance of $\pm 15''$. (The sine of the specified angle is $0.049\ 94 \pm 0.000\ 07$.)



Taper 1 : 10 (Increase of Diameter/Length)

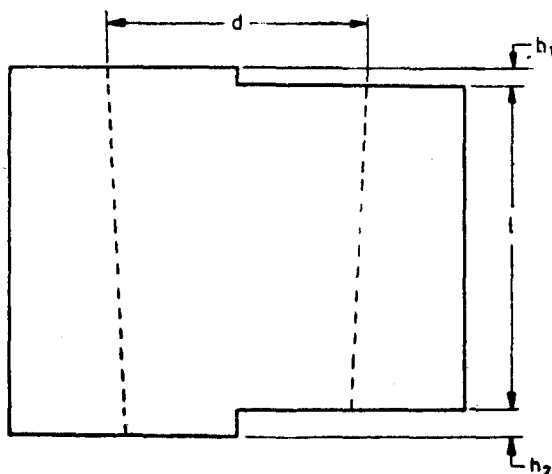
FIG. 2 GAUGE FOR SOCKET

A-1.1.1 The gauges shall be made of hardened steel for each size of joint according to the dimensions given in Table 2.

A-2. PROCEDURE

A-2.1 Rub the components of the joint with a cloth soaked in benzene. Then dip them in benzene and allow to dry. Remove any particles adhering to the surface with a camel hair brush. Then fit the cone or socket to its appropriate gauge (see Fig. 2 and 3) without making use of any sort of grease.

A-2.2 The dimensional requirements of a component shall be taken as having been satisfied if it rests in such a position that the upper and lower



Taper 1 : 10 (Increase of Diameter/Length)

FIG. 3 GAUGE FOR CONE

ends of its ground zone lie wholly within the steps of height h_1 and h_2 respectively (see 4.2.3 and Fig. 1).

APPENDIX B

(Clause 4.2.4)

LEAKAGE TEST FOR CONICAL GROUND-GLASS JOINTS

B-0. GENERAL

B-0.1 The leakage test is carried out on clean dry joints, without applying grease, by observing the rate of increase in pressure in a previously evacuated system in communication with the atmosphere via the leaking joints.

B-1. APPARATUS

B-1.1 The apparatus shall be as illustrated in Fig. 4. Care shall be taken to see that the capacity of the system is approximately 1.5 litres. All joints in the testing apparatus shall be rendered leak-proof and checked before coupling in the joints to be tested. Any leakage found during checking shall be negligible in comparison with the leakage measured during the test.

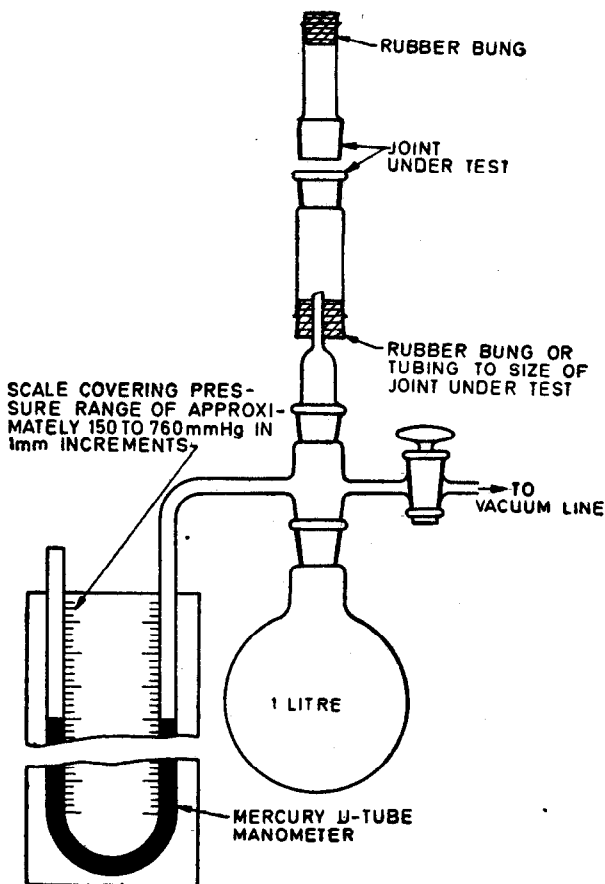


FIG. 4 APPARATUS FOR TESTING LEAKAGE IN CONICAL GROUND-GLASS JOINTS

B-2. PROCEDURE

B-2.1 Clean the components by rubbing with a cloth soaked in benzene, then dip them in benzene and allow to dry. Remove any particles adhering to the surface with a camel hair brush. Fit the components in a vertical position in the apparatus and evacuate the system. Close the stop-cock when the mercury gauge reading is 380 mm. Note the scale reading after one minute and five minutes of closing the stop-cock. Equalize the pressures inside and outside the system, turn the component on its axis through 90° and repeat the test.

B-2.2 The joints shall be considered as having passed the test if the rise in pressure in the system over a period of five minutes does not exceed 10 mm of mercury as indicated by the mercury gauge reading.

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